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TITLE: THE TIME PATTERN OF INDUSTRIAL CONFLICT IN CANADA, 1901-1966

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DRAFT STUDY

prepared for

TASK FORCE ON LABOUR RELATIONS  
(Privy Council Office)  
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PROJECT NO. 52 (a)

Submitted: AUGUST 26, 1968

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## STUDIES

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### THE TIME PATTERN OF INDUSTRIAL CONFLICT IN CANADA, 1901-1966

John Vanderkamp

The University of  
British Columbia.

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This study was made possible through the financial assistance of the Task Force on Labour Relations. Financial support was also received from the Institute of Industrial Relations at the University of British Columbia. I am indebted to my colleague Stuart Jamieson who has written a very intensive historical treatise on this subject entitled "Toil and Trouble: Labour Unrest in Canada 1900 to 1966", prepared for the Task Force on Labour Relations. Mr. S. Q. Lemche provided valuable research assistance.

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## The Time Pattern of Industrial Conflict in Canada 1901-66

John Vanderkamp

### Introduction

Before commencing the more formal analysis it is useful to give a brief historical account of the pattern of industrial conflict in Canada during the present century. This picture is painted with a broad brush obscuring many of the finer points described by S. Jamieson in his monograph. In Table 1 the whole period is divided into eight sub-periods. The complete annual detail is presented graphically in Figures 1 and 2. Reported are three measures of conflict or strike activity, all relative to the overall size of the Canadian labour force.

TABLE 1

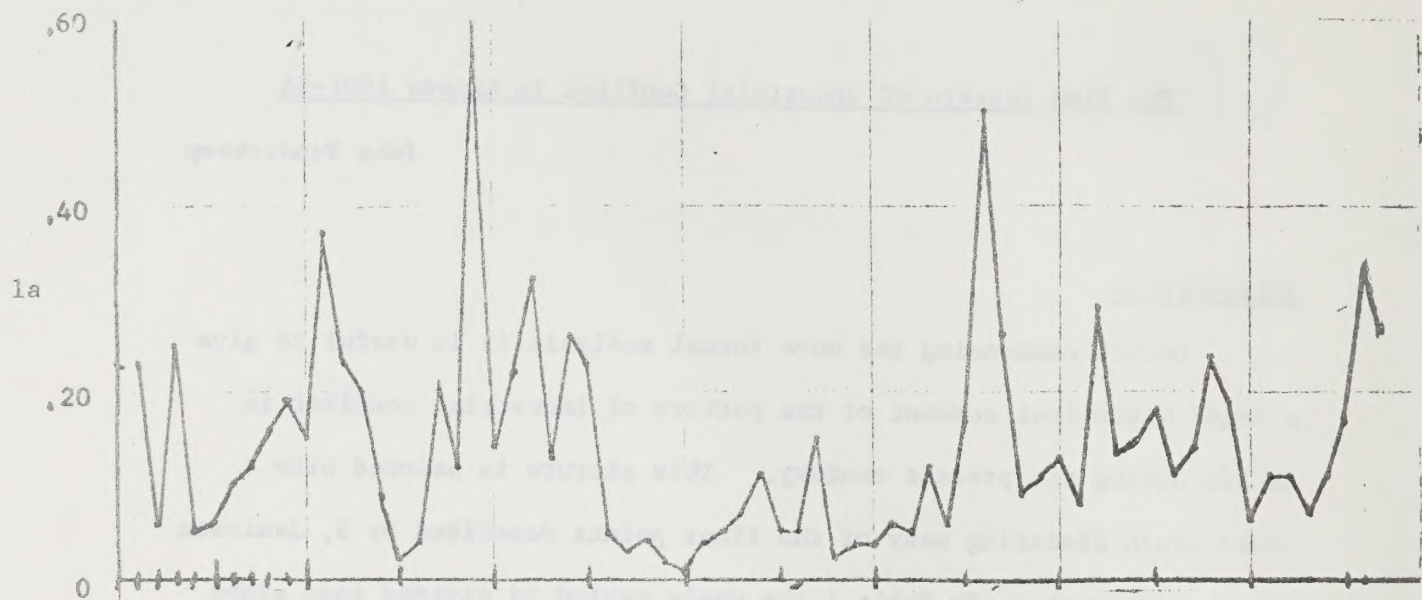
### Industrial Conflict, Economic Performance and Degree of Unionization (annual averages)

<u>Periods</u>	<u>Workers In- volved as % of Labour Force</u>	<u>Number of Strikes <math>\frac{1}{2}</math> Labour Force (x 1,000,000)</u>	<u>Time loss % of Estimated Working Time</u>	<u>Constant \$ G.N.P. per Capita % of Trend</u>	<u>Union Membership % of Labour Force</u>
1. 1901-11	1.04	54.8	.16	110.2	n.a.
2. 1912-20	1.77	61.3	.18	106.4	6.7
3. 1921-29	.81	27.7	.14	93.6	8.5
4. 1930-40	.89	37.2	.06	77.5	8.4
5. 1941-47	2.63	58.4	.17	111.8	13.6
6. 1948-54	1.75	35.6	.14	105.0	21.0
7. 1955-61	1.48	41.3	.15	104.4	24.3
8. 1962-66	2.46	62.8	.16	107.7	22.8

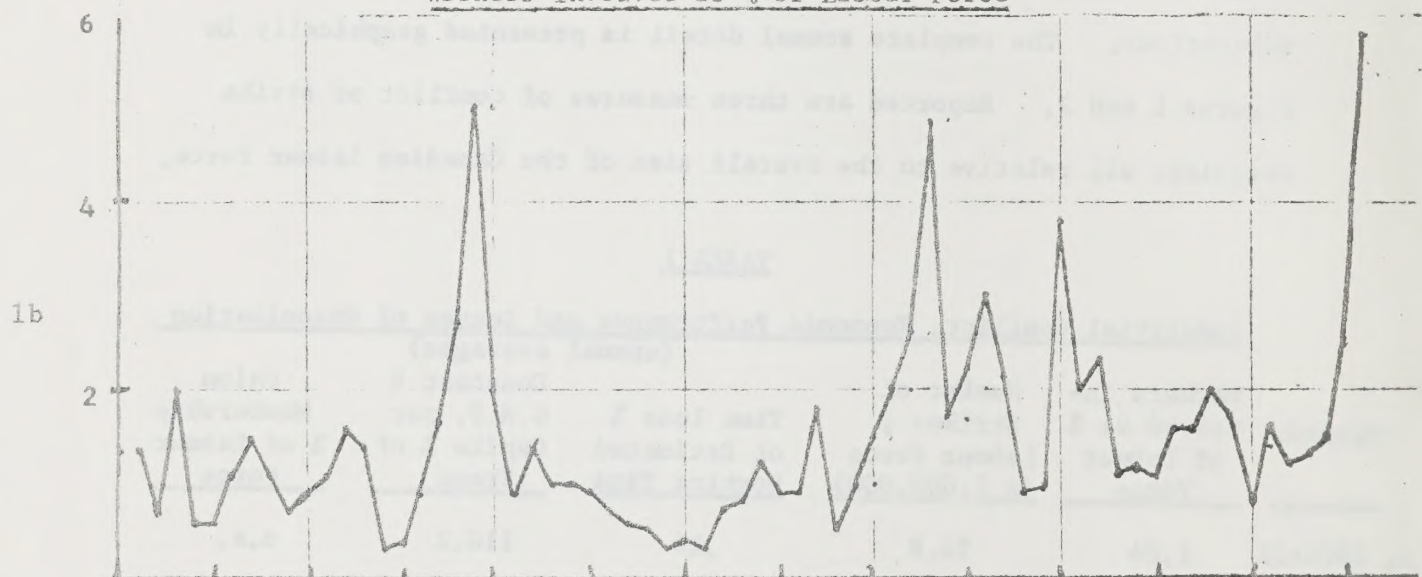
Sources: See Appendix.

Figure 1

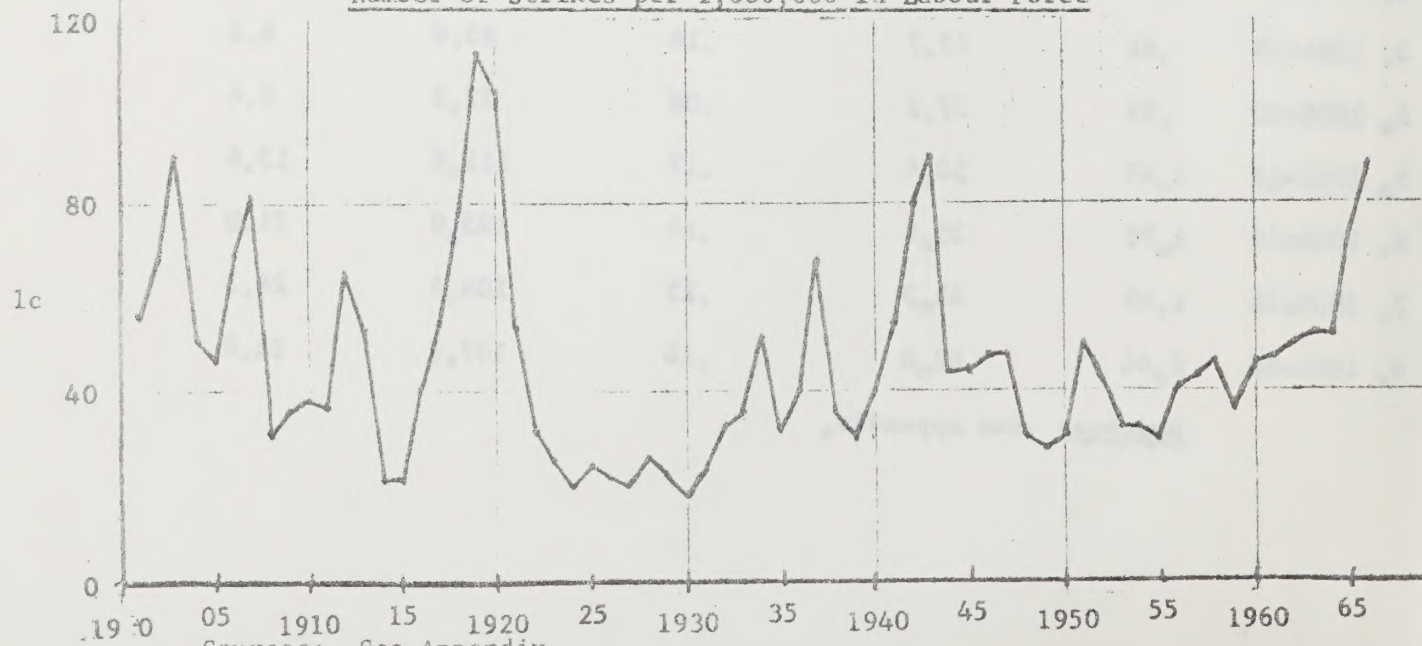
Time Loss as a percentage of Estimated Working Time



Workers Involved as % of Labour Force



Number of Strikes per 1,000,000 in Labour Force

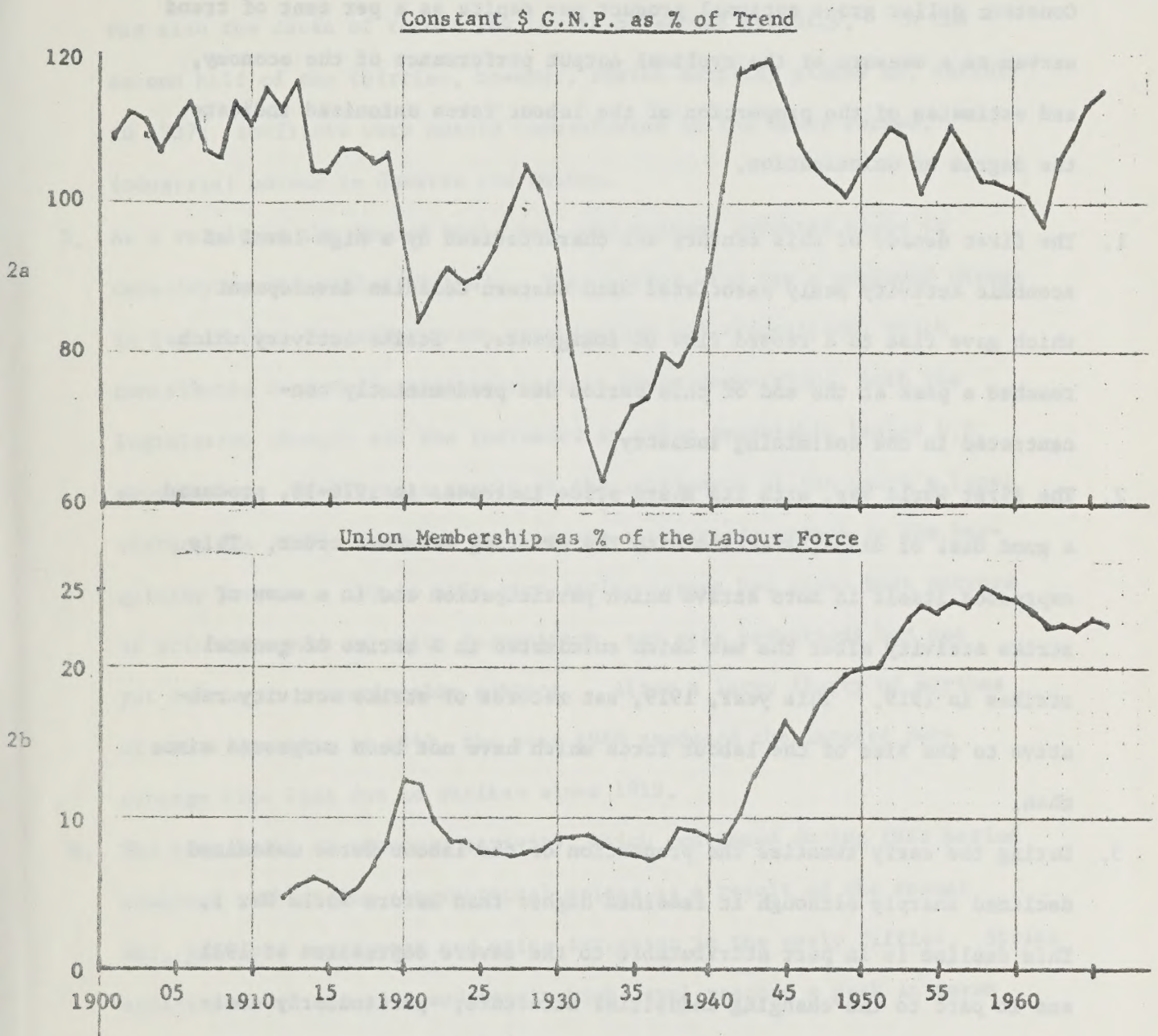


Sources: See Appendix.



Figure 2

3.



Sources: See Appendix.

Constant dollar gross national product per capita as a per cent of trend serves as a measure of the cyclical output performance of the economy, and estimates of the proportion of the labour force unionized indicate the degree of unionization.

1. The first decade of this century was characterized by a high level of economic activity partly associated with Western Canadian development which gave rise to a record flow of immigrants. Strike activity which reached a peak at the end of this period was predominantly concentrated in the coalmining industry.
2. The First World War, with its sharp price increases in 1916-18, produced a good deal of dissatisfaction with the existing economic order. This expressed itself in more active union participation and in a wave of strike activity after the war which culminated in a series of general strikes in 1919. This year, 1919, set records of strike activity relative to the size of the labour force which have not been surpassed since then.
3. During the early twenties the proportion of the labour force unionized declined sharply although it remained higher than before World War I. This decline is in part attributable to the severe depression of 1921 and in part to the changing industrial structure; particularly coalmining was in decline and most of the growth took place in automobile, rubber, chemicals and electrical goods industries. Industrial conflict which was still quite widespread in the early twenties reached minimal levels in the late twenties despite improvements in business activity.
4. The disastrous depression of the nineteen thirties contributed towards a further decline in union participation. The poor economic performance



was also the cause of record low levels of strike activity. In the second half of the thirties, however, strike activity picked up, notably in 1937; conflicts were mostly concentrated in the newly formed, industrial unions in Ontario and Quebec.

5. As a result of the Second World War, the economy operated close to capacity in the period 1941-47. This period also saw a profound change in legislation regarding union organization and recognition, which contributed to a very rapid increase in union membership; both the legislative changes and the increases in union membership lagged U.S. experience. Partly as a result of the settlement of the union's legal status, the strike more and more became a pragmatic weapon in the bargaining process. Up to this time strike issues had often been matters of principle such as union recognition, and wage reductions had not yet become an unmentionable subject. After a large flurry of strikes of short duration in 1943, the year 1946 produced the largest percentage time loss due to strikes since 1919.
6. The high level of economic activity, which continued during this period combined with rising international prices as a result of the Korean War, produced rapid wage and price inflation in the early fifties. Strike activity which was at a moderately high level reached a peak in terms of time loss in the year 1952.
7. The period 1955-61 was characterized by a downward trend in business activity after 1956. Strike activity, however, did not start to decline until after 1958. Even during the early sixties, when there was substantial slack in the economy, the three measures of strike activity did not reach as low levels as in the late nineteen twenties.



8. After the low point of economic activity in the early sixties a cyclical upswing of unprecedented length brought the Canadian economy close to full employment in 1966. Strike activity became particularly pronounced in 1966 with almost 6% of the labour force involved in strikes and with a peak in percentage time loss only exceeded in the last two decades during the year 1946.

Three generalizations emerge from this historical account.

- (i) The overall relation of strike activity to economic performance is not a very strong one. For example, during the depressed thirties strike activity was very low, but during the twenties economic activity showed an increasing trend while strike activity strongly declined. A more detailed and systematic examination of the relation between strike activity and cyclical behaviour forms the main subject of this paper.
- (ii) World War II in many ways represents a watershed with regard to union organization. Legislation concerning the recognition and organization of unions contributed to a rapid increase in union membership as well as a shift in strike issues. This has the implication that the pattern of strike behaviour may be quite different before the Second World War compared with the present.
- (iii) Despite the growth in union membership strike activity as measured by time loss is presently not much more important than during the first part of this century. The annual percentage time loss in period 1901-29 was

roughly the same as for 1941-66 despite the fact that the proportion of the labour force unionized was around 6% in the early years and averaged more than 20% since 1941. On the other hand, the proportion of the labour force involved in strikes is substantially greater now than was the case in the earlier years, which is quite reasonable in view of the increased union participation. It follows from these two observations that the length of time which the typical striker is out on strike has diminished. This conclusion may possibly be linked with the point made above that the strike now represents a more rational weapon in a more pragmatic bargaining process.

The basic question of this study concerns a systematic explanation of the time pattern of industrial conflict. After a brief review of some earlier studies the next section of this paper is devoted to a reconsideration of the theoretical issues. It is argued that the attitudes of the bargaining parties as well as the cost of a strike change with economic conditions, and it is concluded that on balance strike activity may be expected to vary positively with the level of economic activity. In view of the qualifications which are necessary this relationship may not be very strong, and may well have been particularly weak in days gone by when the industrial relations climate was more hostile than at present.

In the third section, the statistical data related to strike activity and economic activity are discussed. It is argued that of the three available measures of strike activity (see Table 1 and Figure 1) the time-loss measure represents the most meaningful and interesting economic concept

and this measure consequently takes first place in the empirical analysis. The level of economic activity is represented by the most comprehensive measure, gross national product in real terms per capita as a percentage of its own trend. This section of the paper also gives a brief description of the regional and industrial dimensions of overall strike activity.

The empirical results are reported in the fourth section. The relation between strike activity and economic performance is not found to be very strong, and it is particularly weak before the Second World War. For the last twenty years the estimated equation shows that more than 50% of the variance of the relative time loss measure is left unexplained by economic activity. While part of this unexplained variance is associated with the year 1946 when the industrial unrest bottled up during the Second World War was released, this result shows that other important factors, perhaps of a political or sociological nature, have been left out of the picture. An attempt is made to evaluate the effect of long term developments, relating to legislation, union organization and changing capital intensity, on the trend in strike activity. It is concluded that the aggregate cost of strikes, as measured by time loss, has not increased over time despite considerable gains in organized collective bargaining. This section also includes a discussion of the relation between Canadian and United States patterns of strike activity. The final section of the paper is devoted to concluding observations and policy implications.

#### Theoretical Arguments

The basic question to be addressed is whether there is a systematic explanation of the time pattern of industrial conflict as sketched in the introductory section. Basic theoretical arguments on this question



are scarce and most of the studies on this subject have adopted ad hoc hypotheses. The reason for this is simply that bargaining theory as it has so far evolved is in a very unsatisfactory state. No acceptable theoretical framework has been constructed to predict the outcome of the bargaining process, viz. the contract wage. And even if this problem of the theoretical indeterminacy of the contract were solved it would still not be likely to throw much light on our question relating to the occurrence of conflict.

Earlier studies<sup>1</sup>, having established that a strike cycle exists, addressed the following question: Does the timing of turning points of this strike cycle correspond to the timing of business cycle turning points? On the whole the answer given to this question has been in the affirmative, although not without exceptions or qualifications. The explanation provided for this correspondence of cyclical patterns was that in times of prosperity employers are under a greater degree of market pressure and unions are keener on making gains. This explanation is at best incomplete, since it is argued that during a prosperous period unions are more demanding, but firms are also more able to meet these demands. I shall shortly return to this basic theoretical issue.

Some of the more detailed studies went further using monthly strike statistics and discovered that the peak of the strike cycle leads the peak of the business cycle by, on average, some five to eight

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<sup>1</sup> For a review of the earlier literature see Andrew Weintraub, "An Analysis of the Cyclical Pattern of Strikes in the United States 1951-1961", unpublished Ph.D. thesis, Rutgers State Univ., 1966. See also his "Prosperity versus Strikes: An Empirical Approach", Industrial and Labor Relations Review, Vol. 19, No. 2, Jan. 1966.

months.<sup>2</sup> Rees explained this lead phenomenon in terms of a divergence of expectations - union's expectations being based on employment performance, which coincides with the business cycle, and employer expectations being formed by such leading indicators as business failures and new orders. Weintraub, who finds the strike lead to have lengthened, rejects Rees' explanation and emphasises the changes in employment are more relevant to union behaviour in its decision to strike. Both these explanations are unsatisfactory since the arguments equally well apply to the business cycle trough where strike activity, however, does not display any lead.<sup>3</sup> Moreover, the lead phenomenon is so unsystematic that a coherent explanation is hardly called for.

Most of the analysis in earlier studies relates to the simple comparison of peaks and troughs in strike activity with those in general business activity (as, for example, measured by the National Bureau of Economic Research<sup>4</sup>). This technique which is widely used in the diagnosis and forecasting of cyclical behaviour is of very limited use in the actual estimation and testing of a quantitative economic relationship. The basic problem is that the timing of peaks and troughs is only one aspect

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<sup>2</sup> See Albert Rees, "Industrial Conflict and Business Fluctuations", Journal of Political Economy, Vol. 60, October 1952, and Andrew Weintraub, op. cit.. The Strike lag at business cycle troughs is more uncertain; it is, for example, not given any discussion in A. Weintraub, op. cit., Ch. 5.

<sup>3</sup> Weintraub's explanation is also unsatisfactory since the strike is "caused" by both parties, not by the union alone.

<sup>4</sup> For reference cycles, see e.g. Geoffrey H. Moore (ed.), Business Cycle Indicators, Princeton, 1964.

of the strength of the presumed relation between strike activity and business cycle behaviour. It is, for example, quite possible that the quantitative relationship between strike activity and some measure of business cycle activity is weak and insignificant, even though there may be a perfect correspondence between the respective peaks and troughs. This implies that there may have been significant shifts in the underlying strike-business activity relationship as a result of legislation or changes in attitudes, even though there is still an observable correspondence between turning points. From the point of view of economic policy formulation the simple comparison of peaks and troughs is therefore of limited interest.

Two general conclusions follow from this review of earlier studies. First, the theoretical arguments have often been of an ad hoc nature and sometimes incomplete or inconsistent. This problem is at least partly attributable to the absence of a satisfactory theory of the bargaining process; the remainder of this section will be devoted to a reconsideration of the theoretical issues. Second, the technique of analyzing the relation between strike activity and business cycle conditions by a comparison of turning points is of limited use and may even hide basic structural changes.

Arriving at a contract is the ultimate purpose of the bargaining process. It is a commonplace statement that the precise contract outcome is theoretically indeterminate, in the sense that the usual assumptions about human behaviour do not allow us to make a specific prediction about the outcome. It is argued that the best one can hope to achieve is the delineation of a range of possible outcomes within which the contract is to be found. This does not mean that no contract will be arrived at, but that the usual assumptions about economic behaviour are not sufficient

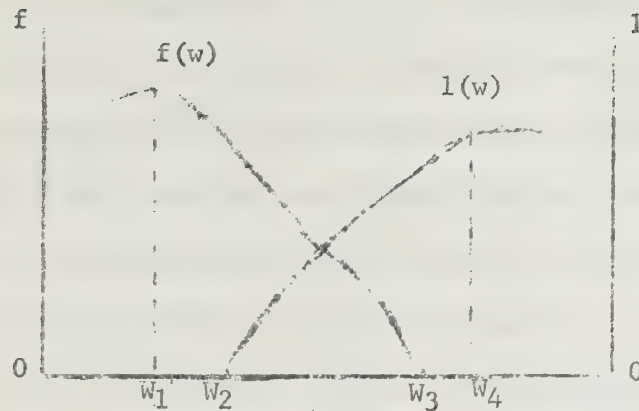


to infer the outcome of the bargaining process. The assumptions which are so pervasive in other areas of economic analysis, revolve around motivations of self interest such as profit maximization and utility maximization. Clearly on its own such an assumption of self interest applied to both parties in a bargaining situation will only under very rare circumstances lead to a contract.

This argument suggests that the maximization assumptions of economic analysis are not very helpful in analyzing the outcome of a bargaining process. Under these circumstances it may be presumed that an alternative assumption which explicitly recognizes the interdependence of the two parties may be more fruitful. Such an assumption which may be described as "live and let live" should have elements of self interest as well as common interest. To develop this we first require a stylized representation of the bargaining situation.

Let us describe the attitudes and desires of the bargaining parties in terms of utility functions related to a range of wage rates which are the sole subject of bargaining. Such utility functions may be pictured as in Figure 3 in which the horizontal axis represents wage rates in ascending order from left to right; the vertical axis on the left hand side measures the firm's utility ( $f$ ) while the right hand vertical axis measures the labour union's utility ( $l$ ). The firm's and union's utility functions which are labelled  $f(w)$  and  $l(w)$  respectively are both shown in the same figure, but they cannot be directly compared as can be witnessed by the different scales on the two vertical axes. These utility functions, which are determined by economic, social and psychological factors, are assumed to be increasing for the union and decreasing for the firm. Wage  $W_1$  is the wage which gives maximum

Figure 3



utility to the firm and can be conceived as the wage which the firm would unilaterally impose if no union existed. Similarly  $w_4$  is the wage which gives maximum utility to the union; beyond this point the negative employment effects of still higher wages would become too severe. At the other end of the spectrum are wages  $w_2$  and  $w_3$  which give zero utility to the union and the firm respectively;  $w_2$  may be related to wages paid in related unions and industries, and  $w_3$  represents a wage at which the firm's profitability reaches a particular minimum level. The range of wages  $w_1 - w_4$  may be termed the bargaining zone: serious bargaining will be confined to this range since outside of it the interests of the two parties do not conflict. The range  $w_2 - w_3$  may be termed the zone of potential agreement since this is the only zone in which both parties might agree to a wage contract. If this zone of potential agreement does not exist the parties cannot reach agreement on any contract, but we may assume that such cases are rare enough to be uninteresting.

As was mentioned above the two utility functions in Figure 1 cannot objectively be compared. But the two parties can clearly make these comparisons for themselves. In making these comparisons either party

can evaluate how much the other party would gain from a particular wage contract. In view of the conflicting as well as common interests of the two parties, I shall assume that the rule describing their behaviour is to achieve a wage contract which gives the two parties equal utility. This rule of bargaining behaviour may be characterized by the phrase "live and let live" referred to earlier. The application of the rule requires that both parties agree that a particular wage - destined to become the contract wage - gives equal utility for both of them. This clearly implies that the contract wage will be reached if both parties have a correct perception of each other's utility function.

Thus the dual purpose of the process of bargaining is (i) to influence the other party's perception of your own utility function, and (ii) to communicate your own perception of the other party's utility function. The bargaining process is one involving communication of information and playing of games, which are quite consistent with the acceptance of our rule of bargaining behaviour. There is an obvious temptation to misrepresent one's own bargaining attitude or utility function. It has long been recognized in the literature of welfare economics that devising a common measure of utilities of different people leads to difficulties since quite naturally, out of self interest, a person will misrepresent his true preferences.

The strike forms the ultimate objective measure of the parties' utilities. When party F does not accept party L's perception of F's subjective gains (i.e. utilities), or if F does not trust its own perception of L's subjective gains, party F may precipitate a strike to serve as an objective verification. This is not to say, of course, that



every bargaining session requires the strike as such a measure. In many cases the strike threat will provide an indirect measure. Moreover, if the parties have a great deal of knowledge about one another and can therefore trust each other's expressions regarding wage utilities, they may apply the equal utility rule without needing any reference to a strike. An important point emerges from this analysis. If the bargaining atmosphere is characterized by recognition of the other party's interests and by knowledge concerning the other party's circumstances, the contract will more frequently be signed without a strike being needed. Such a bargaining atmosphere cannot per se be legislated, but the changes in the legal status of the union brought about during the Second World War created a much greater sense of permanency in the bargaining relation and were probably conducive to a better atmosphere making strikes less important.

The utilities or bargaining attitudes towards different contracts, as shown in Figure 1, change over time in response to economic conditions. When economic conditions deteriorate, when labour markets develop slack and profits are low, the utility functions shift leftwards in terms of Figure 1. As a result the zone of potential agreement (as well as the bargaining zone) shifts leftwards thus leading to contracts with smaller wage increases in times of recession or depression. If it is socially accepted that wages cannot be reduced and both parties are in agreement on this, the zone of potential agreement and the bargaining zone will not only shift leftwards in recessions, but these zones will also become narrower. This narrowing of these zones would appear to make a strike less likely in recession since there is less room for misunderstanding and misrepresentation. Thus we would predict

that the amount of strike activity varies positively with the level of business activity, with the qualification that under circumstances of a more permissive social attitude towards wage-reductions this positive relationship between strike and business activity may be much weaker.

The analysis so far has not included anything about the costs of a strike to both bargaining parties. In a study of the time pattern of industrial conflict these cost elements which no doubt vary over time should clearly not be omitted. The cost of a strike to the union is the loss in income suffered by its members and the subjective effects of this are most likely positively related to the level of economic activity. When economic conditions are favourable union members are receiving higher incomes as a result of longer work weeks and fewer lay-offs, and the union itself is also likely to be in a better financial position. Moreover, when the labour market is tight striking union members have a better chance to obtain temporary employment elsewhere to tide them over the period of the strike. Therefore the disutility of a strike for the union and its members is greatest in depression and relatively smallest during periods of high business activity.

The effects of a strike on the firm are more complex. There are at least three partly offsetting factors determining how the net cost of a strike varies with economic activity.

- (i) At times when the labour market is under pressure, the firm is less easily able to hire strike breakers to continue production during a strike. This means that a strike threatens the firm's profitability more in times of favourable economic conditions. This factor is probably of little importance at present since the

practice of strike breaking has become outmoded with the stronger and more official position of labour unions.

- (ii) The effect of a strike on the firm's profit position depends on the level of production. If we assume that a strike of say two weeks represents a 4% reduction in annual output then the effect of a strike on profits will be relatively more serious at times when the firm is operating well below capacity. This can be illustrated with the following hypothetical example.

TABLE 2  
Example of Effect of 2-week Strike on Profits

	<u>High Level of Production</u>			<u>Low Level of Production</u>		
	<u>Normal</u>	<u>Strike</u>	<u>% Change in Profits</u>	<u>Normal</u>	<u>Strike</u>	<u>% Change in Profits</u>
Total Revenue	\$100	96		\$64	61.4	
Total Variable Costs	50	48		32	30.7	
Total Fixed Costs	30	30		30	30.0	
Profits	\$ 20	\$18	-10%	\$ 2	\$ .7	-65%

N.B. It is assumed that the price of the product is \$1 per unit and the average variable costs are constant at 50¢ per unit.

It is clear from this example that the relative reduction in profits resulting from a strike is substantially greater at low operating rates than at high levels of production. There may also be long run effects: since other firms are more willing to supply the customers of one firm on strike during depressed economic conditions, when all are experiencing low operating rates, a strike may result in a permanent loss of customers.



The absolute dollar change in profits in the example in Table 2 is smaller when the firm is earning small profits, but it is presumed here that the relative concept is the more relevant one. This presumption rests on the notion that to the owners of the firm the marginal utility of a dollar's worth of profits is much greater when few profits are earned than under favourable profit conditions. Moreover, from the point of view of the management of the firm, a reduction in profits when they are already low is more likely to involve reduced dividend payments which may stir otherwise complacent stockholders. We may conclude that under the conditions as stated a strike has a greater disutility to the firm when the level of economic activity is low.

It may also be deduced from this analysis that the cost of a strike to the firm increases with a rising proportion of fixed costs. With increased capital intensity and increased use of overhead facilities and personnel since the turn of the century the typical firm has probably experienced a rise in the ratio of fixed to variable costs. This means that for the typical firm the cost of the strike has been increasing over time, thus making the strike a less desirable event. This may have been a contributing factor in keeping the relative time loss due to strikes from increasing despite the substantial gains in unionization in the last fifty years.

(iii) Under (ii) it was assumed that the firm's annual level of output would be reduced in proportion to the length of the strike both at high and at low levels of production. There are, however, ways in which annual production levels can be maintained despite a strike when a firm is producing at a low operating rate. Specifically two options are open to the firm: (a) stock-piling in anticipation of a strike, and (b) catching up after a strike.

In a number of industries neither of these two options is open, for example, because the demand for the product is immediate and cannot be postponed, or because the product is not sufficiently durable. Furthermore, unions typically take a dim view of option (a) and prevent unusual inventory accumulation by refusing to work overtime. Even when the firm is able to resort to either of these two options they typically involve additional costs (e.g. in connection with overtime) which could be avoided if no strike occurred. In the extreme situation a firm operating at a low production level might be able to maintain its annual production level despite a strike, without additional costs; if a strike were not to take place the firm would, of course, have to lay off workers. In this extreme case profits would be unaffected by a strike at low operating rates.<sup>5</sup> The generalization

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<sup>5</sup> Under these conditions the strike would also be costless from the point of view of the union's members since there would be a lay off otherwise. This tendency goes counter to the tendencies discussed above, since the conclusion here is that the disutility of a strike for the union diminishes as economic conditions deteriorate. However, as long as a strike is costless and without penalty for both parties, it does not provide a sensible measure of the parties' utilities since it does not measure anything at all.

which emerges goes counter to the conclusion under (ii), viz, at low levels of business activity a strike may mean less disutility for the firm because it may be in a better position to maintain production levels despite the strike,

The net effect of (ii) and (iii) is not clear. Most likely for the average firm faced with the possibility of a strike the relative reduction in profits brought about by a strike increases, when economic conditions deteriorate. There are three reasons for reaching this conclusion. First, the two options discussed under (iii) are not open to a number of industries. Second, unions attempt to prevent inventory accumulation in anticipation of a strike. Thirdly, those firms which rely on catching up with production after a strike may find that their customers, unwilling to wait to see orders filled, have temporarily (or worse, permanently) shifted to non-striking competitive producers; these competitive firms can more easily supply such customers in times of low business activity. On the presumption that the relative profit reduction resulting from a strike is the relevant concept, it may be concluded - not without qualifications - that for the average firm the disutility of a strike varies negatively with the level of economic activity.

Let us sum up the theoretical arguments. The strike is conceived as a temporary but sometimes necessary by-product of the bargaining process. The purpose of the strike is to provide an objective measure with which the bargaining attitudes and desires of the parties can be verified. It provides the ultimate check against game-playing and misrepresentation which are quite naturally part of the bargaining process. It follows from this that in a bargaining atmosphere of know-



ledge and trust the strike will play a much less important role since the two parties do not need to resort to a strike to evaluate each other's true bargaining attitudes.<sup>6</sup>

The bargaining attitudes of both parties change with economic conditions. It may be argued that the social attitude towards wage reductions reduces the range of possible bargains during depressed economic conditions. It is inferred from this that the parties are more likely to agree on a contract without the need for a strike when business activity is at low levels.<sup>7</sup> There is another important implication. If through persuasive public policy, such as wage guidelines, the range of possible bargains can be limited, this might well result in a lower level of strike activity.

Turning our attention from the purpose of the strike to its costs it was argued that for the union the disutility of a strike varies contra-cyclically being least when the economy is under most pressure. A similar conclusion was arrived at with regard to the disutility of a strike to the firm but this conclusion was by no means unequivocal since it is based on considerations of opposing influences. The overall conclusion is that, on balance, it may be expected that strike activity

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<sup>6</sup> If the assumption can be made that as time goes on the parties gain more and more knowledge about one another's bargaining methods and their meaning, then it would be predicted from the above argument that the strike will become more and more unnecessary with time and will perhaps entirely "wither away". See A. M. Ross and P. T. Hartman, Changing Patterns of Industrial Conflict, (Wiley, 1960).

<sup>7</sup> It does not necessarily follow from this that the peaks of business activity and strike activity should coincide. It may be that the degree of misunderstanding between parties, which is closely related to the occurrence of strikes, reaches a cyclical peak before general business activity. An illustration of this is the explanation by Albert Rees - referred to above - of the lead of the strike cycle in terms of the diverging expectations of the two parties.

varies positively with the level of economic activity, but, in view of the qualifications which were made as the argument proceeded, this relationship may not be very strong.<sup>8</sup>

### Statistical Data

Having completed the theoretical analysis it is necessary to discuss the statistics which represent the raw material of the formal empirical analysis of the next section of the paper. The main statistics used and their sources are given in the appendix. The purpose of this section is three-fold: to discuss the appropriateness of the three measures of strike activity for Canada as a whole, consider the explanatory variables in particular the measure of overall economic activity, and to show briefly the time patterns of strike activity for regional and industrial groupings.

The three available measures of strike activity shown in Table 1 and Figure 1 are:

- (i) number of workers involved in strikes in existence during the year
- (ii) number of strikes in existence during the year
- (iii) time loss (in man-days) from strikes in existence during the year.

All three strike series are available back to 1901. Which of these measures of industrial conflict should be used depends on the ultimate purpose of the analysis. This paper is basically couched in economic terms and for this purpose the time loss series seems most appropriate. The time loss

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<sup>8</sup> The general theoretical framework advanced above can clearly also be applied in an analysis of the industrial cross-section pattern of strikes. An industry with a great deal of indeterminacy in wage setting and with a low strike cost will be characterized by a high propensity to strike.

measure best represents the yardstick of bargaining attitudes and it comes closest to the theoretical concept of the cost of a strike employed above. Moreover, time loss represents a better measure of the effect of strikes on economic welfare which may be thought of as the output foregone as a result of strikes. Numbers of workers involved and the number of strikes may be of more interest to the sociologist who is basically concerned with the notion of unrest. For our purposes, time loss will therefore take first place in the empirical analysis. This emphasis differs from that of earlier studies of this subject.

It should not be thought that the choice among these three measures of strike activity is a matter of indifference. As was already pointed out in earlier discussion the trends displayed by the three series are not the same: while the number of workers involved has an upward trend, neither of the other measures shows any pronounced trend. The correlation coefficients of the three strike series (for this purpose the series are measured in relation to labour force and estimated working time as in Table 1) for the period 1901 to 1966 are as follows:

Correlation coefficient of (i) and (ii) = .67

" " of (i) and (iii) = .56

" " of (ii) and (iii) = .37

It is clear that the degree of inter-correlation between the three measures of strike activity is not very high; even for the shorter period 1946-66 the correlation coefficients are virtually identical to those shown above. In particular, the number of strikes and the time loss series show weak correlation, but this is not too surprising since there are two uncertain links between the two series. Thus, if the number of workers per strike and



the average duration of strikes do not remain constant - or, at least, do not display any systematic variation over time - , the correlation between (ii) and (iii) may indeed be weak.<sup>9</sup> I conclude that even if theoretical considerations did not suggest a preference for one of the measures of strike activity - in this case a preference for the time loss concept - one would still be forced to make a choice for statistical reasons; clearly because of the weak inter-correlation, and explanation for the time pattern of the time loss measure is not necessarily going to be very satisfactory as an explanation of the time pattern of the number of strikes.

In the theoretical arguments many references have been made to the notion "level of economic activity". Which statistical time series will represent this notion? In this study the choice is the ratio of constant dollar gross national product per capita divided by its trend. This measure, which was also shown in Table 1, has two principal advantages, viz. it is comprehensive, and the G.N.P. and population data are available for all of the period 1901-66. Other cyclical measures such as the unemployment rate or the profit rate are only available for part of the period. Moreover, one may expect that over the long period 1901-66 different measures of cyclical activity would paint roughly the same picture.<sup>10</sup>

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<sup>9</sup> This also provides a plausible explanation why the correlation coefficient of (i) and (ii), and (i) and (iii) are larger since in these cases there is only one link rather than two.

<sup>10</sup> For any short period this may not be true to the same extent. The correlation coefficient between our G.N.P. variable and the unemployment rate for the years 1946-66 is only -.47. Part of this lack of correlation is attributable to the increasing labour force participation rates in the postwar period and another part is related to short run productivity behaviour.

In addition to this measure of cyclical activity I shall employ as an explanatory variable the proportion of the labour force unionized. It will be tested whether this variable has any significant effect on strike activity. It may be argued that, since collective bargaining situations create strikes, one may expect strike activity to increase markedly when the proportion of the labour force unionized increases. This relationship may, however, not be very significant for two reasons: (i) strikes may occur "spontaneously" without involving a formal union organization; and (ii) the main rise in union membership which took place during the Second World War and immediately thereafter is, at least, partly related to legislation concerning union recognition, which by creating a sense of permanency and security may have tended to reduce strike activity. Thus strike activity as measured by time loss may not have noticeably been affected by the rise in unionization; this argument does not necessarily apply to the number of workers involved in strikes, which as was seen in Table 1 have, indeed, increased over time in relation to the labour force.

This paper has so far emphasized the relationship between aggregate measures of strike activity and aggregate economic activity, without being much concerned about the regional or industrial detail. This will continue to be the emphasis in the formal empirical work. There are basically two reasons for not examining regional or industrial time patterns of strike activity. (a) The theoretical propositions have been put forward in terms of average tendencies. At the regional or industrial level these tendencies are likely to be more seriously distorted by special cases and random factors. At the aggregate level some of these random influences will cancel out. (b) Statistics on

economic performance and cyclical activity are not available at the regional or industrial level which means that part of the value of disaggregation would be eliminated.

It is nevertheless useful to give a brief description of the regional and industrial patterns of strike activity. Table 3, which summarizes the pattern of time loss due to strikes by province, shows that the provinces of Ontario, Quebec and British Columbia account for most of the strikes. The figures are also fairly sizeable for Nova Scotia and Alberta, but all of this is accounted for by coalmining strikes confined mostly to the first 25 years of this century. At present the Prairie and Maritime regions account for an almost negligible proportion of the strikes even though they represent more than a quarter of Canada's employment.

The correlation coefficients shown in the first two columns of Table 3 indicate that the time patterns of time loss in the various provinces are not strongly correlated. Even for the provinces of Ontario and Quebec, with their emphasis on manufacturing industries, it only shows a correlation coefficient of .52. The negative coefficients for Nova Scotia and Alberta are attributable to the peculiar strike pattern of the coal mining industry.

The pattern is brought out more clearly in Tables 4 and 5 which summarize the time loss due to strikes by industry. Coal mining dominated the strike scene in the first three decades of this century, but at the present time it only accounts for a very small proportion of the strikes, much more in line with its proportion of total employment. Manufacturing shows somewhat the opposite pattern, increasing strongly



TABLE 3

Time Loss due to Strikes by Province, 1901-66

	<u>Correlation Coefficient</u>		<u>Average Time Loss</u>		<u>Provincial Employment as % of Can. Total</u>	
	<u>with Canada</u>	<u>with Ontario</u>	<u>man-days per year</u>	<u>as % of Canada Total</u>	<u>1921</u>	<u>1961</u>
P. E. Island	.47	.25	280	.0)		
Nova Scotia	.12	-.14	94,660	8.6)	11.0	7.1
New Brunswick	.15	.03	12,000	1.1)		
Quebec	.75	.52	226,800	20.5	24.7	27.9
Ontario	.74	-	353,600	32.0	35.3	37.7
Manitoba	.33	.19	30,850	2.8)		
Saskatchewan	.55	.37	4,410	.4)	22.1	18.2
Alberta	.16	-.07	59,750	5.4)		
British Columbia	.56	.33	173,500	15.7	6.9	9.1
Federal	.59	.23	148,700	13.5	-	-
Total Canada	-	.74	1,104,550	100.0	100.00	100.0

N.B. 1. The Provincial figures are based on unrevised strike series while the Industry figures in Table 4 do incorporate revisions made in 1931 (see Labour Gazette 1931, p. 134); the Canada totals are therefore not exactly comparable in these two tables (see also N.B. of Table 4).

2. The category "Federal" which relates to strikes under federal jurisdiction includes railways most of the time and coal mining some of the time depending on the extent of Federal jurisdiction at the time. This category does not, of course, exist for the employment estimates.

3. Newfoundland is excluded.

Sources: Canada Department of Labour, Labour Gazette, April 1950 Supplement and Strikes and Lockouts in Canada (annual); Employment data from M. McInnis "The Changing Composition of the Canadian Work Force, 1921-61" unpublished paper.

TABLE 4

Time Loss due to Strikes by Industry, 1901-66

	<u>Correlation Coefficient</u>		<u>Average Time Loss</u>		<u>Industry Employment as % of Can. Total</u>	
	<u>with Canada</u>	<u>with Manufacturing</u>	<u>man-days per year</u>	<u>as % of Total</u>	<u>1921</u>	<u>1961</u>
Agriculture	-.12	-.05	310	.0	34.9	10.7
Logging	.34	.27	49,030	4.7	1.3	1.7
Fishing & Trapping	.19	.13	14,830	1.4	1.0	.4
Coal Mining	.16	-.13	185,460	17.7	.8	.2
Other Mining	.45	.31	64,400	6.1	1.1	1.7
Manufacturing	.84	-	509,000	48.5	17.6	23.4
Construction	.47	.26	97,080	9.2	6.1	7.1
Transportation & Public Utilities	.51	.26	97,560	9.3	8.6	8.4
Trade	.39	.40	11,250	1.1	11.1	16.3
Services & Public Administration	.53	.31	20,640	2.0	17.4	30.0
Total	-	.84	1,049,560	100.0	100.0	100.0

N.B. Canada total is not comparable with total for Provinces (see Table 3). Moreover, the total shown here excludes Finance and Unclassified categories, which are also excluded from industrial employment data. Including these two categories the Canada Total would be 1,066,000 man-days per year on average.

Sources: See Table 3.

TABLE 5

Time Loss due to Strikes by Industry  
(% of Canada Total for eight sub periods)

	<u>1901-11</u>	<u>1912-20</u>	<u>1921-29</u>	<u>1930-40</u>	<u>1941-47</u>	<u>1948-54</u>	<u>1955-61</u>	<u>1962-66</u>
Agriculture	.0	.0	.0	.4	.0	.0	.0	.0
Logging	.0	1.3	2.4	11.5	4.3	3.8	12.7	1.7
Fishing & Tr.	2.6	.9	.5	4.3	.5	2.0	2.2	.0
Coal Mining	45.0	24.9	52.7	20.6	18.1	4.0	1.0	.8
Other Mining	2.8	4.3	.3	2.7	3.5	16.0	8.4	5.1
Manufacturing	20.4	36.3	33.8	53.1	70.1	51.1	52.1	52.1
Construction	12.3	13.1	6.1	1.2	.7	7.7	17.1	9.0
Transp. & Public Utilities	16.5	6.2	3.7	4.2	2.1	12.5	3.3	21.4
Trade	.0	.2	.0	1.0	.1	1.3	1.5	3.3
Service & Public Administration	.3	1.2	.3	1.0	.6	1.6	1.7	6.3
Canada Total Annual average (man-days)	66,129	99,630	72,590	32,134	154,094	141,716	171,276	226,733

N.B. 1 The Canada total figures shown also include Finance and Unclassified categories (cf. Table 4). Because of this the percentage figures do not add to 100%; in most periods these two categories are unimportant but in 1912-20 they account for more than 11% of the total shown.

2 Own account fisherman are excluded from 1961 on (see Strikes and Lockouts in Canada 1961).

Source: See Table 3.



with the rise in industrial unionism in the late thirties and early forties. Strikes in the industries of logging, other mining, construction and transportation display erratic patterns which bear little resemblance to one another or to the manufacturing pattern. The correlation coefficients in Table 4 show that in no particular industry is the strike pattern correlated with the manufacturing sector's pattern which because of size dominates the total time loss pattern.

The overall conclusion which emerges is that the strike phenomenon is now much more widespread than during the early decades of this century. In the earlier years the strike scene was dominated by a few industries, i.e. coal mining and to a lesser extent railways. The time pattern of strikes during the first three or four decades is, therefore, quite likely to be a string of special cases. During the post-World War II period, on the other hand, the general influence of economic conditions, suggested in the previous section of the paper, is likely to be of greater importance. Thus we may well find that the relationship between strike activity and economic activity is stronger in the most recent decades than in the early parts of this century,

### Empirical Results

Most of the empirical results to be discussed relate to the percentage time loss variable as our measure of strike activity. It was argued above that the theoretical notions which are essentially economic in nature apply more directly to the time loss concept than to the other two measures of strike activity. To begin with, however, it is useful to show that for all three strike variables the explanation of their time patterns in terms of our economic activity variable is

substantially better for the period after World War II than before. Table 6 gives the coefficients of determination for the equations relating strike activity variables to the cycle variable for four different periods.

It is evident from the  $R^2$  -figures given in this table that the explanatory power of our business activity variable is not overwhelming, although in all cases the parameters carry the expected positive sign. For none of the periods does the simple regression even explain 50% of the variance in any of the strike variables. Only for the period 1946-66 are the relations of all three strike variables to the business cycle variable significant at the 99% level. Given this low level of explanatory power the importance of the positive relation between strike activity and business activity is clearly much greater for the most recent period. In the analysis above three reasons were given why one might well expect the positive relation between strike activity and economic performance to be stronger for the years since World War II.

TABLE 6  
Coefficients of Determination ( $R^2$ )

		<u>1901-66</u>	<u>1912-66</u>	<u>1927-66</u>	<u>1946-66</u>
(i)	Workers involved as % of Labour Force	<u>.132</u>	<u>.217</u>	<u>.271</u>	<u>.318</u>
(ii)	Number of Strikes per 1 million Labour Force	<u>.109</u>	.103	.130	<u>.305</u>
(iii)	Time loss as % of Estimated Working Time	.078	.084	<u>.186</u>	<u>.427</u>

N.B. 1. Underlined figures are significant at the 99% level, others at the 95% level.

2. The explanatory variable in all cases is Constant \$ G.N.P. as a % of Trend; for (iii) this variable is one year lagged but for (i) and (ii) it is current.

Sources: see Appendix.

(i) Before the Second World War the question of union recognition was not a settled issue as it is now. Attempts at destroying union organizations were by no means a rare occurrence during the first forty years of this century. Since these attempts were more concentrated during depressed economic conditions the bargaining attitudes of the two parties would tend to diverge when the economy was depressed, thus leading to more strike activity. This tendency weakens the significance of the positive relation between strike activity and economic performance.

(ii) Before World War II the case of wage reductions was not yet socially unacceptable and therefore not yet ruled out by both parties in the bargaining process. This creates the same type of divergence in bargaining attitudes in depression as is discussed under (i).

(iii) Before the forties the number of industries and firms which were unionized and experienced strike activity was relatively small. This means that at that time the random element introduced by special cases was much more important. In the most recent decades no one industry has dominated the time pattern of strikes in the way in which coal mining dominated the strike pattern in the first twenty-five years of the century.

It may be concluded that for anyone or all of these three reasons the positive relation between economic performance and strike activity, particularly time loss, is much stronger in the recent decades than before World War II.

This conclusion is reinforced when we take a closer look at the estimated equations for the percentage time loss variable as represented in Table 7. This table presents estimated relations for periods before and after the Second World War. While the cyclical coefficient for the period 1901-39 has the expected positive sign, it is not even



significant at the 95% confidence level. On the other hand, the cyclical coefficient for 1946-66 is easily significant at the 99% level; for this period the cyclical variable explains 43% of the variation in the time loss percentage.

Included in two of the equations in Table 7 is a war time dummy. This dummy variable is used to allow for a shift in the underlying relation as a result of war-time emergency during 1914-18 and 1940-45.

TABLE 7

Regression Equations for Percentage Time Loss due to Strikes

	Constant \$ G.N.P. ÷ Trend (%) <u>lagged</u>	War-time Dummy (1 for years in two World Wars 0 otherwise)	<u>Constant Term</u>	<u>R<sup>2</sup></u>
1901-39	.0023 (.0013)	-.0720 (.0531)	-.079	.092
1946-66	.0163 (.0043)		-1.546	.427
1901-66	.0023 (.0010)	-.0814 (.0353)	-.130	.150

- N.B. 1. The equations are written in the usual way with only the dependent variable (= Time loss due to strikes as a percentage of estimated working time) on left side of equality sign.
2. Figures in brackets are standard errors related to the coefficients.

Sources: See Appendix.

With the emphasis on "vital" war-time production and official measures to restrain strike activity, one would expect this dummy to carry a negative coefficient. The two parameters reported for the war-time

dummy in Table 7 are, indeed, both negative although it does not reach the 95% significance level for 1901-39. It is interesting to note that the inclusion of a war-time dummy in similar equations using workers involved and number of strikes as dependent variables does not produce significant results. This implies that these two measures of strike activity were not reduced during the two war-time periods, whereas the time loss measure was significantly decreased. These results suggest that basic industrial unrest is not kept down during war-time emergencies, but that the economic loss attributable to strikes is, in fact, reduced.<sup>11</sup> This reduction in time loss due to strikes may only be of a temporary nature. Indeed, the strong peaks in time loss in 1919 and 1946 may well be the result of a postponement of strike activity until after the war. The amount of time loss in these immediate postwar years was very substantially above normal as measured by our equation for 1901-66; about 40% of the overall residual variance unexplained by the equation for 1901-66 is accounted for by the residual variances for 1919 and 1946. This suggests that the strike waves which immediately followed the two World Wars may have been the result of "bottling up" of industrial conflict during the wars. Taking the periods 1914-1919 and 1940-1946 as a whole the level of strike activity was not very different from normal (see also Table 1 at the beginning of the paper); for the average year in the periods 1914-19 and 1940-46 the residual variance unexplained by our economic performance variable is indeed quite small, as may also be judged from the size of the war-time dummy's parameter in Table 7.

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<sup>11</sup> These results also reinforce the conclusion reached earlier that time loss is the more significant measure of strike activity from an economic point of view.

Despite the weak explanatory power of the equations, the quantitative effect of economic conditions on strike activity is quite substantial as can be seen from the coefficients in Table 7. Using the equation estimated for 1946-66, it can be calculated that the percentage of estimated time lost due to strikes tends to increase from less than .10% to about .25% when the economy moves from a position of trend output (i.e. constant \$ G.N.P. equals 100% of trend) to a position where output is 10% in excess of trend (i.e. constant \$ G.N.P. = 110% of trend). For present day policy purposes the use of the 1946-66 equation is more relevant than the 1901-66 equation. It has been extensively argued above that we might well expect the effect of economic conditions on strike activity to be more significant and more important in the post World War II period than before. This expectation has indeed been confirmed. The clear implication of this is that a prediction concerning strike activity in the present should not be derived from the historical experience during the first three or four decades of this century.

The equations of Table 7 are the final equations arrived at after a fairly intensive testing process. The main results from these tests will occupy most of the remainder of this section.

The investigation of the lag and lead structure of the equation gave a rather simple result. The current variable of economic activity gives better results than its lagged form and substantially better results than its leading version. This applies to all three measures of strike activity with the exception of the time loss variable in which case the lagged form of our economic performance variable is somewhat superior; it is the lagged form which appears in the equations of Table 7.



We therefore conclude that the level of strike activity in a particular year is influenced by the current level of economic activity, but in the case of the time loss measure by last year's level of activity.<sup>12</sup>

The use of annual data does not permit any precise testing of short lags. Only lags or leads of more than six months would tend to show up when annual observations are employed. In the earlier discussion of the literature on this subject it was observed that peaks in strike activity lead peaks in the business cycle; the measure of strike activity used was the number of strikes beginning in a month. There are two reasons why such a lead may not show up in our analysis of the time pattern of the number of strikes in existence during the year which is most strongly related to the current annual level of economic activity. Firstly, the leads observed by Rees and others are uncertain and quite short.<sup>13</sup> Secondly, the leads at cycle peaks are at least partly counter-balanced by even more uncertain lags at business cycle troughs.<sup>14</sup>

In the course of the theoretical discussion a number of long term developments were mentioned which may have affected the level of strike activity. Their effects may be listed as follows:

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<sup>12</sup> Through the simultaneous inclusion of current and lagged forms of our business activity variable, it was also possible to test whether the change in economic activity is important for the level of strikes; this hypothesis is conclusively rejected.

<sup>13</sup> See A. Rees op. cit., p. 374; the mean lead is only 5 months with average deviation from the mean of 4 months. In A. Weintraub op. cit., the lead is about 8 months with an average deviation of about 7 months.

<sup>14</sup> A third reason could be added that the studies by Rees and others use series on strikes beginning in a particular period which is more likely to display a cyclical lead than the Canadian series of strikes in existence.

- (a) Legislation securing the recognition and organization of labour unions is likely to have reduced the level of strike activity, particularly after the Second World War.
- (b) Bargaining relationships are likely to become more mature with time and the accompanying increases in knowledge and understanding will probably create a secular decline in strike activity.
- (c) The increasing capital intensity of industry has made the strike more costly to the individual firm and has thus likely contributed to a decline in strike activity.
- (d) Partly as a result of the developments under (a) the proportion of the labour force unionized and under collective bargaining arrangements has been rising particularly during and immediately after the Second World War. This development by itself will tend to increase the level of strike activity.

It is not possible to assess the effects of these long term developments separately. Quantitative information about these developments is not available, or in the case of the rate of unionization it is incomplete. The second difficulty is that the timing of some of these developments is correlated with one another, and also with the pattern of economic performance. For example, events (a) and (d) both took place mostly during the early forties, and economic performance, which was on the whole below par between the two World Wars, was at about the

same time raised to a substantially higher level.

One of the main conclusions of the earlier empirical discussion is that the relationship between strike activity and business activity - although still not overwhelming - has become more significant and more important (i.e. increased slope) since the Second World War. There has not, however, been a significant upward (or downward) shift in the relationship. This was tested with the aid of a dummy variable (with a value of unity for the years from 1941 on and zero before this year) which proved completely insignificant in the explanation of all three strike variables. This lack of evidence for an upward (or downward) shift in strike activity during the Second World War may be interpreted to mean that the developments listed above have tended to offset one another. Thus the same change in legislation and political climate which fostered the growth of labour unions (raising potential strike activity) also created a sense of permanency in the bargaining relationship which reduced the need for strikes.

Specific evidence to support such a generalization is, however, difficult to obtain. The following equation was fitted for the period 1912-66 using the percentage time loss as dependent variable Y;  $X_1$  is constant \$ G.N.P. per capita as a percentage of trend,  $X_2$  is union membership as a percentage of the labour force (only available from 1912 on) and  $X_3$  is a linear time trend (starting with 1 for 1901).

$$(1) \quad Y = .0613 + .0011 X_1 + .0121 X_2 - .0051 X_3 \quad R^2 = .149$$
$$(.0012) \quad (.0055) \quad (.0023)$$

According to this equation union membership does, indeed, appear to have a positive effect on strike activity as measured by time loss, but this



effect over the course of the last 50 years is entirely offset by the negative time trend. This may be construed as evidence for such a generalization. There are however, at least two serious difficulties. First, the linear time trend, variable  $X_3$ , may also represent other trend-like developments such as (b) and (c) listed above. Second, our variable of economic performance  $X_1$  which was significant before becomes insignificant when  $X_2$  and  $X_3$  are also introduced as may be seen from the standard error in equation (1). Part of the apparent influence of a greater union membership on time loss may therefore in fact be the effect of a better level of economic performance.<sup>15</sup>

As it is difficult to measure separately the effects of the long term developments listed above, we may resort to an evaluation of the net effects of these developments taken together. For this purpose a linear time trend is included along with our economic performance variable to explain the pattern of the three strike variables over the period 1901-66. The regression results show that there is no significant trend in two of the strike variables, time loss and the number of strikes, while there is a significant upward trend in the workers' involved measure of strike activity. Thus the aggregate cost of strikes, as measured by the percentage time loss concept, has not increased over time despite

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<sup>15</sup> The inclusion of a union membership variable creates some strange results for the period 1946-66. In multiple regressions of the three strike variables on the independent variables used in equation (1), the coefficients of the union membership variable are all three significantly negative for this period. This is attributable to the peculiar patterns of the particular variables involved: The unionization rate displays a hill-type pattern with a peak in the mid-fifties, but the three strike variables display more of a valley-type pattern with peaks in 1946 and 1966. Whatever the rationalization may be for this result it is difficult to accept it as a meaningful explanation of strike behaviour, since the union membership variable is meant not to explain year-to-year variations in strike activity but broad changes in its level.

considerable gains in organized collective bargaining. The number of strikes does not display an upward trend partly because the size of the typical bargaining unit has increased considerably during the present century. It is not surprising that the number of workers involved in strikes (relative to the size of the labour force) does show an upward trend since the increase in unionization may be expected to have a stronger effect on this measure of strike activity. The number of workers measure is not affected by the length of time of strikes nor by the size of the bargaining unit.

The final question addressed in the empirical section concerns the relation between Canadian and U. S. levels of strike activity. Reliable United States data on strikes are only available from 1927 on. Table 8 shows the comparison of Canadian and U. S. percentage time loss data for broad periods similar to Table 1 above. <sup>16</sup>

TABLE 8

Time Loss due to Strikes in the United States and Canada  
(as % of Estimated Working Time)

	<u>United States</u>	<u>Canada</u>
1927-29	.20	.03
1930-40	.24	.06
1941-47	.42	.17
1948-54	.38	.14
1955-61	.26	.15
1962-66	.17	.16

<sup>16</sup> Sources of the U.S. data in Table 8 and subsequent regressions:  
A. M. Ross and P. T. Hartman op cit. appendix; Monthly Labor Review,  
June 1967, Bureau of Labor Statistics;  
Handbook of Labor Statistics, 1967 edition, Bureau of Labor Statistics,  
U.S. Dept. of Labor;  
Employment and Earnings Statistics for the United States, 1909-66,  
Bureau of Labor Statistics Bulletin 1312.

Two important conclusions can be drawn from Table 8. Firstly, the level of strike activity, as measured by time loss, is clearly higher in the U. S. than in Canada; this is true for practically all individual years in the period 1927-66 with the exception of 1966 when the percentage time loss in Canada was almost double the U. S. figure. It is not within the realm of this paper to discuss the reasons for this difference in strike activity between the two countries. Secondly, the time pattern of strike activity while displaying some similarity, also shows striking differences between the two countries. As examples of the dissimilarities, in the late twenties and thirties strike activity in Canada was at an all time low, but in the most recent five years the United States on average experienced its lowest strike levels. This difference in levels during the sixties deserves additional comments.

After the steel strike in 1959 U. S. strike activity remained low; despite the long recovery in economic activity, the percentage time loss only increased from a low of .13% in 1963 to .19% in 1966. In Canada time loss due to strikes, however, increased sharply from .07% in 1963 to .34% in 1966. One possible explanation for this difference in behaviour is that the low level of strike activity in the U. S. in recent years is a by-product of the guidelines policy. The abandonment of wage guidelines by the U. S. at the beginning of 1967 coincided with a return to a substantially higher level of time loss due to strikes of .29% for 1967 as a whole, compared with .26% for Canada. It follows quite naturally from the theoretical argument presented above that wage guidelines, if accepted by both parties, will tend to narrow the bargaining zone and the zone of potential agreement, and thus will more likely lead



to a contract without the need for a strike, particularly at times of strong business activity. It should be emphasized that this is only one possible explanation for the U. S. strike pattern in the most recent years for which the empirical evidence is not very strong. The reason is that the time patterns of Canadian and U. S. time loss figures have in the past been quite different for reasons unrelated to guidelines policies.

In the regression of the annual figures of U. S. and Canadian percentage time loss for 1927-66 the coefficient of determination ( $R^2$ ) is only .500; for the period 1946-66 the picture is similar with  $R^2$  equal to .514.<sup>17</sup> This lack of similarity between the strike patterns in the two countries has a very important implication in connection with this study. The patterns of economic performance in the two countries have been broadly similar for many decades, but the patterns of strike activity do not display the same similarity. Thus, it would be impossible to find for both countries a very good explanation of the strike patterns in terms of their respective and similar patterns of economic activity. It suggests that it is not likely that even for the last two decades the time pattern of strike activity in Canada can be explained entirely in terms of our indicator of the business cycle. This supports

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<sup>17</sup> Regressions for the strike measures of workers involved and number of strikes produced the following  $R^2$  statistics:

	<u>1927-66</u>	<u>1946-66</u>
Canada and U.S. Workers Involved	.125	.025
Canada and U.S. Number of Strikes	.120	.124

There are two statistical differences between these series;  
(i) U.S. figures relate to strikes beginning in a year while Canadian data cover all strikes in existence during a year;  
(ii) Canadian figures are standardized by a Labour Force series (see Appendix), but U.S. figures are divided by non-agricultural employment data.

the earlier finding that in the recent period the level of economic performance plays a significant and important role in determining the level of strike activity, but that it is clearly not able to explain anywhere near all of the variation in the pattern of strikes.

The following equation shows the extent to which the Canadian time loss variable is correlated with the United States time loss after allowing for the influence of the cyclical activity variable, for 1946-66.

$$(a) \quad Y = -1.116 + .0115 X_1 + .2015 X_4 \quad R^2 = .704$$

(.0034)                      (.0491)

Variables Y and  $X_1$  are as defined above and  $X_4$  is the U. S. time loss as a percentage of estimated working time. The equation shows that Canadian time loss is significantly correlated with U. S. time loss even after allowing for cyclical influences.

One interpretation which can be put on this equation is that part of Canada's strike activity is "imported" from the United States through union as well as business links between the two countries. If this interpretation is accepted it may be stated that cyclical fluctuations together with U. S. strike activity "explain" 70% of the variance in the Canadian strike pattern. It is dangerous, however, to draw this conclusion from the regression equation presented above. Canadian and United States economic time series in many areas typically have quite a lot in common, and very often similarity simply reflects similarity in underlying causal factors. In the case of strike activity these causal factors of strike patterns may exist, but presently be unidentified. As an illustration I refer to the above discussion of the high level of strike activity in the year 1946 which was attributed to a "bottling up" of industrial conflict during World War II. The

United States was involved in the same war and the year 1946 also registered a record level of strike activity with time loss amounting to 1.43% of estimated working time. Thus the correlation between Canadian and U. S. time loss variables is for a good part the result of the high level of strikes in 1946 which was related to the common war experience.<sup>18</sup> I therefore conclude that the correlation between Canadian and U.S. strike activity, which is not overwhelming in any case, cannot easily be attributed to a direct cause-and-effect link.

### Summary and Conclusions

As was stated at the beginning the basic question of this study concerns a systematic explanation of the time pattern of industrial conflict; a number of side-issues are also explored, but these are better left out of the summary. It is concluded after lengthy theoretical argument that, on balance, strike activity may be expected to vary positively with the level of economic activity. It is also reasoned that this relationship between strike activity and economic performance may be expected to be more significant and more important for the period after World War II than before.

In the empirical work the percentage time loss measure is principally used to represent strike activity, as it encompasses more than the number of strikes or workers' involved measures. Both of the latter concepts leave the length of strikes out of account, and the number of

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<sup>18</sup> Using the second equation in Table 7 the year 1946 accounts for almost 30% of the residual variance in the whole period 1946-66. On the other hand, using the above equation with U.S. time loss as an "explanatory" variable, the year 1946 is very well "explained" and contributes less than 1% to the residual variance.



strikes is, moreover, strongly influenced by the institutional arrangements regarding the size of the bargaining unit. This emphasis on percentage time loss as the most preferred measure of strike activity constitutes a significant departure from earlier studies. The time loss concept is the best yardstick of bargaining attitudes and of the notion of the cost of a strike to the two parties. Moreover, this concept best approximates the effect of industrial conflict on economic welfare. The sociological notion of industrial unrest, on the other hand, may well be measured more appropriately by the number of strikes or the number of workers involved.

The theoretical expectations are confirmed by the empirical work. Before the Second World War business activity has a weakly positive influence on strike activity. For the most recent decades the positive effect of economic performance on the level of strikes is both more significant and stronger. Even so the explanatory power of the level of business activity is not particularly great for the recent period, leaving more than 50% of the variance of time loss due to strikes unexplained. Part of this unexplained variance can be identified with the year 1946 when the industrial unrest bottled up during the Second World War was released repeating the pattern of World War I and thereafter.

The weak statistical relationship shows that economic activity may be statistically significant in explaining strike activity, but that it is not the dominating influence suggested by some earlier studies. The lack of correlation between Canadian and U. S. time series of industrial conflict gives powerful support to this conclusion in view of the similarities in economic performance and labour union history of the two countries.

It can therefore not be argued that the time pattern of conflict is rigidly determined by the economy's performance and it can certainly not be concluded that a change in bargaining atmosphere or labour legislation will be incapable of changing this pattern.

Insofar as strike activity is related to economic activity, we should clearly look at the experience since the Second World War for prediction and guidance. The time pattern of industrial unrest in the first four decades of this century may not be of much direct help at present. What guidance does the estimated relationship provide? It provides us with a certain perspective in viewing particular events. For example, we may infer that a fairly high level of strike activity was to be expected in 1966 in view of the performance of the economy. The actual time loss in 1966 was somewhat above expectation, taking into account the level of business activity.<sup>19</sup>

The "strike wave" of 1966 caused a good deal of upheaval and controversy. If such an event sparks a rethinking of the framework of collective bargaining and of labour legislation, it may clearly exert a beneficial influence in the long run. On the other hand, the crisis atmosphere of a "strike wave" may lend to the hasty drafting of ill-conceived legislation which may create more serious problems in the future. The perspective provided by the empirical relation between strike activity and economic performance may help to avoid such crisis reactions. The establishment of the Canadian Task Force on Labour Relations in response to the strike wave of 1966 shows that this crisis reaction was indeed avoided.

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<sup>19</sup> Using the second equation of Table 7 above, the expected time loss percentage for 1966 is .29% compared with the actual time loss of .34%. On the other hand, the actual time loss in 1967 of .26% was below the .32% to be expected using the same equation.

Should it be concluded from the relation between strike activity and economic performance that the attainment of continuous "full employment" will inevitably be accompanied by a high level of strikes? This conclusion is not justified for two reasons. Firstly, the relation is too weak to support such a conclusion. Secondly, there is a reasonable hypothesis, advanced by S. Jamieson<sup>20</sup> which attributes the industrial conflict phenomenon to the very instability in economic performance. The Jamieson hypothesis is based on the idea that instability in labour relations is to be blamed on economic instability. While this hypothesis does not help us very much in analyzing the time pattern of strikes, it clearly carries the implication that the elimination of cyclical instability will also help to eliminate strike activity. Unfortunately, the Jamieson hypothesis cannot be tested against our experience, but it should nevertheless be borne in mind when we evaluate the possible effect of continuous full employment on the level of strike activity.

It is argued in the theoretical section that changes in public attitudes, particularly if accompanied by appropriate government policy changes, may bring about important alterations in strike activity. The empirical evidence on this subject is mostly indirect; it includes the following two items: broad changes in public attitudes towards wage reduction and union organization have altered the cyclical time pattern of strikes after the Second World War; improved knowledge and mutual trust combined with legislation concerning union recognition have helped to keep down the aggregate cost of strikes, as measured by time loss,

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<sup>20</sup> See S. Jamieson, "Toil and Trouble: Labour Unrest in Canada 1900 to 1966", unpublished paper prepared for Task Force on Labour Relations.



despite the considerable increase in organized collective bargaining since the late thirties.

It is not easy to see what implications may be drawn from this. Would an increase in union membership, e.g. to 50% of the labour force, have the effect of increasing or reducing the total time loss attributable to strikes? Since the turn of the century there have been substantial increases in unionization without a perceptible rise in relative time loss. This favourable development may only have been the result of perhaps non-recurring events, such as changes in public attitudes towards unions, changes in legislation regarding union recognition, and increases in the cost of the strike to both parties. On the other hand, these changes in attitudes and policies may be prerequisite to any increase in union organization. When we look at international comparisons we do not discern any systematic relationship between the proportion of a country's work force unionized and its level of strike activity.<sup>21</sup> But this lack of a relation between unionization and strike activity may be attributable to cultural and political differences between the countries. The answer to the question posed above must therefore be the rather weak statement that there is no necessary presumption that strike activity will rise when the level of unionization is increased.

What types of government policy are capable of changing the pattern and level of industrial conflict? Legislation related to union recognition has probably run most of its course. On the other hand, publicly established guidelines about the range of issues which are the

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<sup>21</sup> See Arthur M. Ross and Paul J. Hartman, Changing Patterns of Industrial Conflict, (Wiley, New York, 1960).

subject of collective bargaining, may well have a profound impact on the level of strike activity. These guidelines may be informal and simply represent the "good example" of industrial relations in the public service. More formal guidelines enunciated by the federal government may be based on the advice of tri-partite bodies (government - labour - management) common in Western European countries. Such an arrangement needs to be developed with great care in the Canadian case because of its federal system of government.

Wages are the most important item of collective bargaining and wage guidelines policies are therefore of greatest interest. It is argued above that a wage guidelines policy, which receives widespread support, may well reduce the level of strike activity as it limits the range of possible contracts between the two parties. A not altogether convincing piece of evidence is the relatively low level of strikes in the U. S. during the years 1962-66, when wage guidelines were in effect. Further study of this subject is clearly in order. In any case, the pros and cons of guidelines policies are typically judged in terms of their effects on economic stabilization and perhaps also on market allocation, but the reduction in strike activity is only likely to be a by-product of such a policy.

APPENDIX

Main Statistical Series

	(1)	(2)	(3)	(4)	(5)
	Workers Involved as % of Labour Force	Time Lost as % of Estimated Working Time	Number of Strikes per 1 Million in Labour Force	Constant \$ GNP per Capita as % of Trend	Union Membership as % of the Labour Force
1901	1.35	.23	55.5	108.3	N.A.
2	.69	.06	67.7	112.0	N.A.
3	1.99	.25	90.8	110.5	N.A.
4	.57	.05	51.1	107.3	N.A.
5	.59	.06	45.6	110.4	N.A.
6	1.08	.10	69.1	113.2	N.A.
7	1.47	.12	81.2	106.6	N.A.
8	1.08	.16	31.3	105.9	N.A.
9	.72	.19	35.7	113.2	N.A.
10	.85	.15	38.4	110.4	N.A.
1911	1.08	.37	36.7	114.5	N.A.
12	1.55	.23	65.3	112.2	4.8
13	1.42	.20	53.4	115.9	5.6
14	.33	.09	21.6	104.0	6.0
15	.39	.02	21.4	104.3	5.6
16	.90	.04	40.9	106.9	4.9
17	1.71	.21	54.4	106.8	5.5
18	2.70	.12	77.8	105.0	6.9
19	4.96	.60	112.0	106.1	8.3
20	1.96	.14	104.8	96.4	12.3
1921	.91	.22	53.8	84.2	12.0
22	1.36	.32	32.2	88.3	9.7
23	1.03	.13	25.9	91.4	8.3
24	1.03	.26	20.9	88.6	8.3
25	.85	.23	25.4	89.6	7.6
26	.67	.05	21.7	94.3	7.6
27	.60	.03	20.1	99.4	7.4
28	.46	.04	25.8	104.9	7.6
29	.34	.02	23.4	101.5	7.8
30	.37	.01	18.2	94.1	8.7
1931	.29	.04	24.0	79.5	8.8
32	.67	.05	33.4	69.5	8.9
33	.77	.07	36.2	63.3	8.2
34	1.24	.11	51.5	69.2	7.7
35	.88	.05	31.8	72.6	7.4



Main Statistical Series continued

	(1)	(2)	(3)	(4)	(5)
	Workers Involved as % of Labour Force	Time Loss as % of Estimated Working Time	Number of Strikes per 1 million in Labour Force	Constant \$ GNP per Capita as % of Trend	Union Membership as % of the Labour Force
1936	.89	.05	40.1	74.1	7.2
37	1.75	.15	67.6	79.5	7.8
38	.50	.02	36.2	77.9	9.4
39	1.00	.04	29.6	81.7	9.3
40	1.45	.04	40.2	91.2	8.6
1941	2.04	.06	54.1	101.6	8.5
42	2.57	.05	79.8	117.2	10.4
43	4.86	.12	89.5	118.3	12.9
44	1.68	.06	44.4	119.3	14.8
45	2.16	.17	44.3	113.5	16.3
46	2.94	.50	48.1	107.7	15.0
47	2.14	.26	48.5	105.3	17.1
48	.86	.09	31.1	103.3	18.4
49	1.03	.11	27.4	100.8	19.6
50	3.80	.13	31.8	104.1	19.9
1951	2.00	.08	50.2	106.5	20.0
52	2.31	.29	42.4	109.7	21.9
53	1.06	.13	33.0	109.3	23.1
54	1.18	.15	33.1	101.5	24.1
55	1.12	.18	29.6	105.7	23.6
56	1.59	.11	41.1	110.4	24.3
57	1.58	.14	43.1	106.6	24.0
58	1.95	.24	45.6	103.3	25.3
59	1.71	.19	37.3	102.9	24.9
60	.82	.06	45.7	101.5	24.4
1961	1.60	.11	47.0	100.5	23.7
62	1.18	.11	49.6	96.9	22.7
63	1.32	.07	52.4	105.5	22.9
64	1.52	.11	51.7	108.7	22.5
65	2.50	.17	72.9	112.5	23.1
66	5.76	.34	87.3	114.7	23.0

Explanatory Notes

(1) Number of workers involved in strikes in existence during the year as a percentage of the labour force.

Sources: Workers involved from Canada Department of Labour, Labour Gazette, April 1950 Suppl., and Strikes and Lockouts in Canada (annual) (see in particular 1961 issue).

Labour force estimates 1921-1966 from Historical Statistics of Canada, and D.B.S. Labour Force Survey; estimates for 1901-1920 based on Labour Force participation rates derived from Census of Canada 1901, 1911, and 1921 and population estimates from Historical Statistics of Canada.

- (2) Time loss due to strikes in existence during the year as a percentage of total estimated working time.

Sources: Percentage time loss figures for 1919-1966 from Labour Gazette April 1950 Suppl. and Strikes and Lockouts in Canada (annual). For 1901-1918 Time Loss from Labour Gazette April 1950, and Estimated Working Time based on Labour Force estimates (see (1) above) and average number of working days in a "working year" employed by Department of Labour for period 1919-29.

- (3) Number of strikes in existence during the year divided by Labour force estimates (x 1,000,000).

Sources: see (1) above.

- (4) Constant dollar Gross National Product per person in the population as a percentage of trend.

Sources: G.N.P. 1901-1925 from O. J. Firestone Canada's Economic Development, p. 276, based on 1935-9 prices, converted to constant 1949 dollars by using ratio of Constant 1949 \$ G.N.P. for the  
Constant 1935-9 \$ G.N.P.

year 1926.

G.N.P. 1926-60 from Historical Statistics of Canada, p. 132.

G.N.P. 1961-66 from D.B.S. National Accounts, 1966, p. 56.

Population figures from Historical Statistics of Canada.

Trend is log-linear trend fitted to the constant \$ G.N.P. per capita data for period 1901-66.

- (5) Total union membership as a percentage of the labour force.

Sources: Union membership from Historical Statistics of Canada only available for period 1912-66.

Labour force see (1) above.







